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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/563,009

12/28/2005

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EXAMINER

BERDICHEVSKY, MIRIAM

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

11/17/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/563,009	Applicant(s) SAWADA ET AL.	
	Examiner MIRIAM BERDICHEVSKY	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/3/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remarks

Claims 1 and 4 have been amended. Claim 8 is canceled. Claim 10 is new.

Claims 1-7 and 9-10 are currently pending.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (US 4781765) and Nakamura (JP 59035016).

As to claim 1, Watanabe teaches a silicon based thin film solar cell, wherein a conducted type silicon based low refractive index layer (column 2, lines 30-42) and a silicon based interface layer are disposed and contact one another in this order on a

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backside of a photoelectric conversion layer observed from a light incident side (figure 2).

Watanabe is silent to the silicon based interface layer comprising a crystalline silicon component in the layer.

Nakurama teaches that the silicon based solar cell that comprises a crystalline silicon component in the layer (abstract).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the layer with a crystalline component of Nakamura in Yagashimi because the solar cell will have the merits of both phases, as taught by Nakamura (abstract). Amorphous silicon has the advantage that it can be easily deposited over large areas while the advantage of crystalline silicon is the increased stability against light exposure. One of ordinary skill would appreciate that by using both materials the composite would be able to optimize the composition so as to gain the advantages of both with a reasonable expectation of success and predictable results (MPEP 2144).

Regarding claim 2, as there is no structural difference, the low refractive index layer with a crystalline component and a silicon based interface layer will inherently have a refractive index of not more than 2.5 at a wavelength of 600 nm.

Regarding claims 3-4, Watanabe teaches that the most abundantly existing constituent element, excluding silicon, in the silicon based low refractive index layer is oxygen up to 50 atomic % (column 7, lines 14-18).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use at least 25% oxygen in Watanabe because Watanabe teaches that the

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oxygen concentration is a result effective variable (figure 3B) and it has been held to be within the skill of a worker in the art to determine the optimum value of a result effective variable involves only routine skill in the art especially since where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists (MPEP 2144.05).

Regarding claims 5 and 10, Watanabe is silent to the silicon based low refractive index layer has a thickness of not less than 300 angstroms.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a thickness not less than 300 angstroms in Watanabe because increasing the thickness of the low refractive index layer will increase the region for blocking undesired diffusion from the back electrode and it has been held to be within the skill of a worker in the art to determine the optimum value of a result effective variable involves only routine skill in the art (MPEP 2144.05).

Regarding claim 6, Watanabe is silent to the silicon based low refractive index layer comprises a crystalline silicon component in the layer.

Nakamura teaches that the silicon based low refractive index layer comprises a crystalline silicon component in the layer (abstract).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the layer with a crystalline component of Nakamura in Yagashimi because the solar cell will have the merits of both phases, as taught by Nakamura (abstract). Amorphous silicon has the advantage that it can be easily deposited over large areas while the advantage of crystalline silicon is the increased stability against

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light exposure. One of ordinary skill would appreciate that by using both materials the composite would be able to optimize the composition so as to gain the advantages of both with a reasonable expectation of success and predictable results (MPEP 2144).

Regarding claim 7, Watanabe teaches that the silicon based interface layer is between 50 and 200 angstroms but is silent to a thickness of specifically not more than 150 angstroms.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a thickness of specifically not more than 150 angstroms in Watanabe because Watanabe teaches that the oxygen concentration is a result effective variable (figure 3B) and it has been held to be within the skill of a worker in the art to determine the optimum value of a result effective variable involves only routine skill in the art especially since where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists (MPEP 2144.05).

Regarding claim 9, Watanabe teaches that the low refractive index layer and silicon based interface layer include the same conductivity type (column 2, lines 30-42).

Response to Arguments

4. Applicant's arguments filed 7/16/2009 have been fully considered but they are not persuasive. Applicant argues that Watanabe alloys the silicon layer for a different reason, diffusion prevention, than Applicant, decreasing resistance. In response to applicant's argument that the reason for alloying in Watanabe differs from that of the instant invention, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for

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patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Applicant argues that Watanabe teaches away from use of a crystalline component in the n sublayers of Watanabe because such a modification would change the principle operation of Watanabe. The Examiner disagrees. One of ordinary skill would appreciate that Watanabe is open to a crystalline component as Watanabe's device is composed *mainly* of amorphous silicon (col. 1, lines 40-45) and does not state that use of a crystalline component would make the invention of Watanabe inoperable. Applicant argues that the operation would change because the alloying is only used to prevent diffusion in amorphous silicon such that a crystalline component would render the need of alloying moot. The Examiner disagrees. The combination as presented has both amorphous and crystalline components such that retaining the alloying for diffusion prevention in the amorphous components would have been obvious to one of ordinary skill in the art to with reasonable expectation of success and predictable results (MPEP 2144). Applicant's arguments that neither reference teaches the decreased contact resistance of the instant invention are moot as not being commensurate with the scope of the claims. Applicant argues that Watanabe teaches away from oxygen concentrations of 25% or more and that Watanabe fails to recognize oxygen concentration as a result effective variable. Watanabe shows oxygen concentration versus conversion efficiency and therefore teaches that oxygen concentration is a result effective variable (figure 3b). The Examiner notes that Applicant teaches that the oxygen concentration between about 5% and 30% display relatively higher conversion efficiencies than the extremes

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and more particularly about 25% to about 25% (figure 3b). One of ordinary skill in the art would be capable of maximizing all variables so as to optimize the end product.

Applicant argues unexpected results. However, the unexpected results are not commensurate with the scope of the claims. Applicant's Table 1 does not teach unexpected results for different oxygen concentrations above 25% to support the entire range as the only examples include 48% atomic oxygen concentration (Applicant's [0041] and [0045]). The comparison between the examples of Table 1 is in determining that the % oxygen is the cause of unexpected results because all three examples have other variables in addition to oxygen concentration. Further clarification and support is required.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Correspondence

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to **MIRIAM BERDICHEVSKY** whose telephone number is (571)270-5256. The examiner can normally be reached on M-Th, 10am-8pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Michener can be reached on (571) 272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./

Examiner, Art Unit 1795

/Jennifer K. Michener/

Supervisory Patent Examiner, Art Unit 1795